Roll No.: 0 0 0 0 0 0 3 7 8 3 9 6

Test Date: 13/11/2016

Centre Code: 1 0 5

Test Booklet Code **B**

TEST No. 1

ALL INDIA AAKASH TEST SERIES



for MEDICAL Entrance Exams -2017

National Eligibility-cum-Entrance Test (NEET)

INSTRUCTIONS FOR CANDIDATES

1. Read each question carefully.
2. It is mandatory to use Blue/Black Ball Point Pen to darken the appropriate circle in the answer sheet.
3. Mark should be dark and should completely fill the circle.
4. Rough work must not be done on the answer sheet.
5. Do not use white-fluid or any other rubbing material on answer sheet. No change in the answer once marked.
6. Student cannot use log tables and calculators or any other material in the examination hall.
7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.
8. Each correct answer carries four marks. One mark will be deducted for each incorrect answer from the total score.
9. Before handing over the answer sheet to the invigilator, candidate should check that Roll No. and Centre Code have been filled and marked correctly.
10. Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.

Note : It is compulsory to fill Roll No. and Test Booklet Code on answer sheet, otherwise your answer sheet will be rejected.

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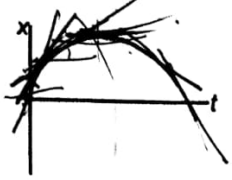
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Time : 3 Hrs. **TEST - I** MM : 720

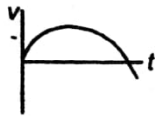
[PHYSICS]

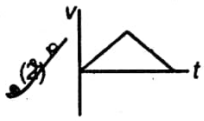
Choose the correct answer :

1. The displacement-time(x-t) graph of a particle moving on a straight line is shown.

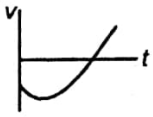


The corresponding velocity-time(v-t) graph is best shown by

(1) 

(2) 

(3) 

(4) 

2. A man swims to and fro along the bank of a river with speed v relative to water. If velocity of flow is u then average speed of the man in to and fro motion is

(1) $\frac{u+v}{2}$ (2) $\frac{v^2-u^2}{v}$

(3) Zero (4) $\sqrt{uv}$

3. At a metro station a girl walks up a stationary escalator in time t_1. If she just stands on the moving escalator then escalator takes her up in time t_2. The time taken by her to walk up the moving escalator will be

(1) $\frac{t_1t_2}{t_1+t_2}$ (2) t_1-t_2

(3) $\frac{t_1+t_2}{2}$ (4) $\frac{t_1t_2}{t_2-t_1}$

4. A body starts from rest and moves with constant acceleration a. The ratio of distance covered by the body in n^{th} second to that in n second from start is

(1) $\frac{n^2}{2n-1}$ (2) $\frac{2n-1}{2n^2}$

(3) $\frac{1}{n}$ (4) $\frac{2n-1}{n^2}$

5. A particle is projected vertically up with initial speed u. It is at the same height at t = 4 s and t = 6 s. If g = 10 m/s^2 then u is

(1) 50 m/s (2) 20 m/s

(3) 30 m/s (4) 40 m/s

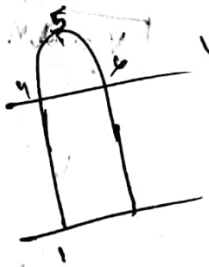
6. An object is dropped from rest from height H. The distance travelled in time t, $2t$ and $3t$ are in the ratio

(1) 1 : 3 : 5 (2) 1 : 5 : 9

(3) 1 : 2 : 3 (4) 1 : 4 : 9

Space for Rough Work





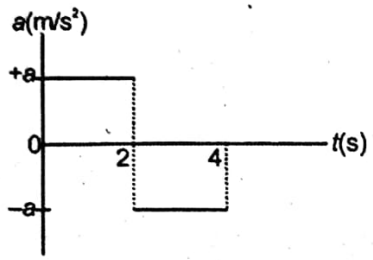
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7. A body is allowed to fall from altitude 100 m. If the time taken in first 50 m is t_1 and for remaining 50 m is t_2, then neglecting air friction

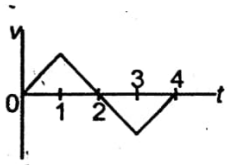
(1) $t_1 > t_2$ (2) Depends on mass

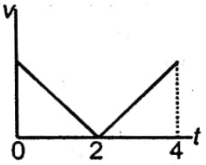
(3) $t_1 = t_2$ (4) $t_2 > t_1$

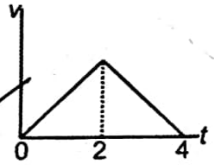
8. The acceleration-time(a-t) graph of a particle moving on a straight line is as shown

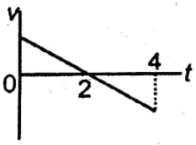


The corresponding velocity-time(v-t) graph will be

(1) 

(2) 

(3) 

(4) 

9. The velocity v of a particle moving on a straight line as a function of time t is given as $v = v_0 + gt + ft^2$ where v_0, g and f are constants. If the particle starts from origin then its displacement just after $t = 1$ s is

(1) $v_0 + \frac{g}{2} + f$ (2) $v_0 + 2g + 3f$

(3) $v_0 + \frac{g}{2} + \frac{f}{3}$ (4) $v_0 + g + f$

10. Two balls are dropped from height h and $2h$ respectively. The ratio of time taken by these balls to reach the ground is

(1) 2 : 1 (2) 1 : 4

(3) $1 : \sqrt{2}$ (4) $\sqrt{2} : 1$

11. A body starts from rest with uniform acceleration. If its velocity after n second is v then assuming straight line motion, its displacement in last two seconds is

(1) $\frac{v(n-1)}{n}$ (2) $\frac{2v(n-1)}{n}$

(3) $\frac{2v(n+1)}{n}$ (4) $\frac{v(n+1)}{n}$

12. A body A starts from rest with acceleration a_1. After 2 seconds another body B starts from rest with acceleration a_2. If they travel equal distance in 5th second from the start of A then $a_1 : a_2$ equal to

(1) 9 : 5 (2) 9 : 7

(3) 5 : 9 (4) 5 : 7

13. If velocity v of a particle moving on a straight line as a function of position x is given as $v = x^2 + 5x + 4$ then acceleration of the particle when velocity of the particle is zero, is (units are standard)

(1) 3 (2) 4

(3) Zero (4) 2

14. The speed of two identical cars moving on a straight line are u and $4u$ at a specific instant. If brakes applied to them are identical then ratio of respective distances in which the two cars can be stopped is

(1) 1 : 8 (2) 1 : 16

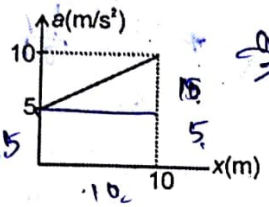
(3) 1 : 1 (4) 1 : 4

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15. The acceleration-position (a-x) curve of a particle moving on a straight line as shown. If initial velocity of the particle is $5\sqrt{3}$ m/s then velocity of the particle at x = 10 m is



(1) 20 m/s (2) 25 m/s

(3) 10 m/s (4) 15 m/s

16. The position x of an object moving on a straight line as a function of velocity v is given as $x = \frac{v^2}{4}$. If the particle starts from origin then position of the particle after 2 s is

(1) 4 m (2) 8 m

(3) 2 m (4) 6 m

17. A particle starts moving with velocity v_0 along a straight line. A constant acceleration a_0 exists in the opposite direction of motion. At the instant when the particle comes to rest, the acceleration reverses its direction, keeping its magnitude same. The distance travelled by the particle till the instant when it attains same velocity is

(1) $\frac{v_0^2}{a_0}$ (2) $\frac{2v_0^2}{a_0}$

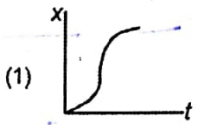
(3) $\frac{v_0^2}{2a_0}$ (4) $\frac{3v_0^2}{2a_0}$

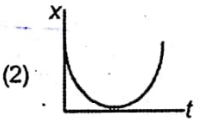
18. Two cars A and B are moving on a straight line in the same direction with velocities v_1 and v_2 respectively. When they are separated by distance d then car A starts decelerating with value a_1 and car B starts accelerating with a_2. The minimum value of d so that the cars do not collide is

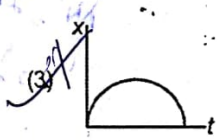
(1) $\frac{(v_1-v_2)^2}{2(a_1-a_2)}$ (2) $\frac{(v_1+v_2)^2}{2(a_1-a_2)}$

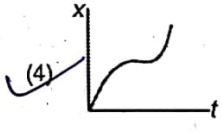
(3) $\frac{(v_1-v_2)^2}{2(a_1+a_2)}$ (4) $\frac{(v_1+v_2)^2}{2(a_1+a_2)}$

19. Velocity v of a particle moving on a straight line as a function of time t is given by $v = 4 - t$ in SI units. Its corresponding distance-time(x – t) relation is best shown by

(1) 

(2) 

(3) 

(4) 

20. A body starts from rest on a straight line and travels distance $2s$ with uniform acceleration. Then $2s$ distance uniformly and finally comes to rest after moving $3s$ distance. Ratio of average velocity to maximum velocity is

(1) $\frac{5}{3}$ (2) 1

(3) $\frac{3}{5}$ (4) $\frac{7}{12}$

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21. Acceleration a of a particle moving in straight line as a function of velocity v is given as $a = g - kv$ where g and k are constants. If the object starts from rest then velocity of the object after very long time is

(1) $\frac{g}{k^2}$ (2) $\frac{g}{2k}$

(3) $\frac{g}{k}$ (4) $\frac{2g}{k}$

22. Velocity v of an object varies with position x as $v = x^2$. What is the acceleration of the object when slope of v - x curve is equal to one?

(1) $\frac{1}{4}$ m/s^2 (2) $\frac{1}{2}$ m/s^2

(3) 2 m/s^2 (4) 1 m/s^2

23. Assume that speed(v) of ripples on the water surface depends on surface tension(s), density(d) and wavelength(λ). Using dimensional analysis the speed (v) can be given as

(1) $\sqrt{\frac{\lambda}{sd}}$ (2) $\sqrt{\lambda sd}$

(3) $\sqrt{\frac{d}{\lambda s}}$ (4) $\sqrt{\frac{s}{\lambda d}}$

24. Let $y = \sin\theta$. If percentage error in measuring angle at $\theta = \frac{\pi}{4}$ is 2% then the percentage error in y at that angle is

(1) $\frac{\pi}{8}$ (2) π

(3) $\frac{\pi}{2}$ (4) $\frac{\pi}{4}$

25. Which of the following is not a unit of energy?

(1) kg-m/s

(2) joule

(3) watt-second

(4) newton-metre

26. Focal length f of a curved mirror is given by $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$, where u and v are object and image positions respectively then choose the correct relation.

(1) $\frac{\Delta f}{f} = \frac{\Delta u}{u} + \frac{\Delta v}{v} + \left(\frac{u+v}{uv}\right)$

(2) $\frac{\Delta f}{f^2} = \frac{\Delta v}{v^2} + \frac{\Delta u}{u^2}$

(3) $\frac{\Delta f}{f} = \frac{\Delta u}{u} + \frac{\Delta v}{v}$

(4) $\frac{\Delta f}{f} = \frac{\Delta u}{v} + \frac{\Delta v}{u}$

27. A physical quantity P is given as $P = \frac{xy^2}{z^3}$. If percentage error in x, y and z are 1%, 3% and 2% respectively then percentage error in P is

(1) 13% (2) 7%

(3) 10% (4) 4%

28. A cylindrical wire has mass (0.3 ± 0.003) g, radius = (0.5 ± 0.005) mm and length (6 ± 0.06) cm. The maximum percentage error in density is

(1) 3% (2) 4%

(3) 1% (4) 2%

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29. Through a resistor R, the potential difference applied $V = (8 \pm 0.5)$ volt and current I through it is (2 ± 0.2) A. The value of R (in ohm) should be reported as

(1) $4 \pm 10\%$ (2) $4 \pm 8\%$

(3) $4 \pm 16.25\%$ (4) $4 \pm 6.25\%$

30. The length, breadth and thickness of a block are given by $l = 12$ cm, $b = 6$ cm and $t = 2.45$ cm respectively. Then its volume with significant figures is

(1) 1.76×10^2 cm^3 (2) 1.7×10^2 cm^3

(3) 2×10^2 cm^3 (4) 2.0×10^2 cm^3

31. The mass of two bodies m_1 and m_2 is given as $m_1 = 2.39$ g and $m_2 = 12.1$ g. Taking into consideration the significant figures, here $m_1 + m_2$ is given as

(1) 14.49 g (2) 14.3 g

(3) 14.4 g (4) 14.5 g

32. A quantity P is given as $P = \frac{A^3 B^{1/2}}{C^4 D^{3/2}}$. The quantity which brings maximum error in P is

(1) C (2) D

(3) A (4) B

33. Position of a particle is given as $x = \frac{v_0}{\alpha}(1 - e^{-\alpha t})$, where v_0 is constant and $\alpha > 0$. In this equation, the dimensions of v_0 and α are respectively

(1) $[M^0LT^0]$ and $[T^{-1}]$ (2) $[M^0LT^{-1}]$ and $[T^{-1}]$

(3) $[MLT^{-1}]$ and $[T]$ (4) $[M^0LT^{-1}]$ and $[LT^{-2}]$

34. Velocity v of an object as a function of time t is given as $v = \frac{b}{t} + ct^2 + dt^3$. The dimensional formula of b is

(1) $[M^0L^0T]$ (2) $[MLT^{-1}]$

(3) $[M^0LT^0]$ (4) $[ML^0T^0]$

35. In the relation $y = \frac{ma}{\alpha}\log\left(1 + \frac{\alpha L}{ma}\right)$ the dimensions of y is (Given m : mass, a : acceleration and L is length)

(1) $[M^0LT^0]$ (2) $[MT^{-3}]$

(3) $[MLT^{-2}]$ (4) $[MT^{-2}]$

36. Which of the following relations can't be derived using dimensional analysis? (Symbols have usual meanings)

(1) $s = ut + \frac{1}{2}at^2$ (2) $y = A\log x$

(3) $Q = Q_0 e^{-t/RC}$ (4) All of these

37. In a new system of unit, the unit of mass is 10 kg, unit of length is 100 m and unit of time is 100 s. Convert one joule into this new system.

(1) $\frac{1}{10}$ unit (2) 1000 unit

(3) 10 unit (4) 100 unit

38. If force(F), velocity(v) and kinetic energy (E) are taken as fundamental units then dimensional formula for time t in them is

(1) $[FvE^{-1}]$ (2) $[EF^2v^{-2}]$

(3) $[EFv]$ (4) $[EF^{-1}v^{-1}]$

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39. In a vernier callipers, length of 10 main scale division is 2 mm. If 20 vernier scale divisions coincide with 18 main scale divisions then the least count of the instrument is

(1) 0.01 mm (2) 0.02 mm

(3) 0.1 mm (4) 0.2 mm

40. A quantity x changes with time t as $x = \frac{1}{t^2}$. If the percentage error in time t is 1% then percentage error in x at that instant is

(1) 2% (2) 4%

(3) 1% (4) $\frac{1}{2}$%

41. A stone is dropped from a height such that it can reach the ground in 5 second. It is however stopped after 3 second of its fall and then again released. Total time taken by the stone to reach the ground in this manner is (take $g = 10\ m/s^2$)

(1) 7 s (2) 8 s

(3) 5 s (4) 6 s

42. A train is moving on a straight line with constant acceleration. The front and the rear end of the train passes a standing person with velocities v_1 and v_2 respectively. What is the instantaneous velocity of the train when sixty percent of the length of the train has passed that person?

(1) $\frac{3}{5}\sqrt{\frac{v_1^2+v_2^2}{2}}$ (2) $\sqrt{\frac{3}{5}(v_1^2+v_2^2)}$

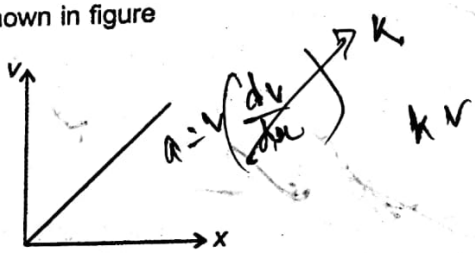
(3) $\sqrt{\frac{v_1^2+v_2^2}{2}}$ (4) $\sqrt{\frac{2v_1^2+3v_2^2}{5}}$

43. Velocity v of an object moving on a straight line as a function of time t is given by $v = 4 - t^2$, where SI unit is observed. The average speed of the particle between 0 to 3 s time interval is

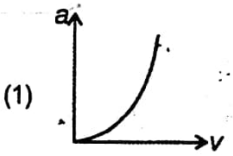
(1) 5 m/s (2) 3 m/s

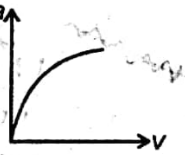
(3) $\frac{20}{9}$ m/s (4) $\frac{23}{9}$ m/s

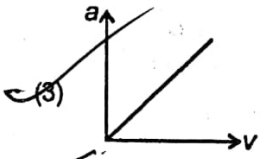
44. The velocity versus position (v-x) curve of an object is given as shown in figure

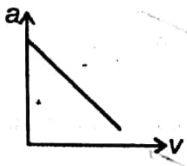


The corresponding acceleration versus velocity (a-v) curve is best shown by

(1) 

(2) 

(3) 

(4) 

45. The velocity of an object moving on a straight line as a function of time t is given as

$$v = \frac{t^3}{3} - \frac{5t^2}{2} + 6t$$

The time at which acceleration of the particle will be negative is(v is in m/s and t is in second)

(1) 2.5 s (2) 1 s

(3) 4 s (4) 3 s

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[CHEMISTRY]

46. Consider the following statements

(a) B_2 contain only π–bond

(b) sp^3 contain 25% s-character

(c) $\dot{\sigma}2p_z$ contain one nodal plane

Correct statement is/are

(1) a, b

(2) Only b

(3) Only c

(4) All are correct

47. If z is internuclear axis which will have zero overlap?

(1) $p_x - p_z$ (2) $s - s$

(3) $s - p_z$ (4) $p_x - p_x$

48. Which of the following have intramolecular H-bonding?

(1) Chloral hydrate

(2) Sulphuric acid

(3) Crystalline potassium bicarbonate

(4) p-nitrophenol

49. Which reaction change the geometry of underlined atoms?

(1) $\underline{N}H_3 + H^{\oplus} \longrightarrow \underline{N}H_4^{\oplus}$

(2) $\underline{S}O_2 + O_2 + H_2O \longrightarrow H_2\underline{S}O_4$

(3) $\underline{B}F_3 + F^{\ominus} \longrightarrow \underline{B}F_4^{\ominus}$

(4) Both (2) & (3)

50. In which of the following transition both magnetic moment and bond order increases?

(1) $CO \rightarrow CO^{\oplus}$ (2) $O_2 \rightarrow O_2^{\oplus}$

(3) $O_2 \rightarrow O_2^{\ominus}$ (4) Both (1) & (2)

51. Molecule having linear shape and sp^3d hybridisation is

(1) CO_2

(2) $I_3^{\ominus}$

(3) BeF_2

(4) Both (1) & (2)

52. Consider the following statement

(a) $R-\overset{\oplus}{C}=\ddot{O}:$ less stable than $R-C\equiv\overset{\oplus}{O}:$

(b) π bond in benzyne formed by hybridized orbital

(c) NH_3 have more bond angle than NF_3

(d) CH_3Cl is more polar than CH_2Cl_2

Correct statement is/are

(1) a, c

(2) b, d

(3) a, b, d

(4) All are correct

53. Which of the following have sp^2 hybridisation for underlined atom?

(1) $\underline{N}O_2$

(2) $\underline{C}H_3$

(3) $CH_2 = CH - \underline{C}H_2$

(4) All of these

Space for Rough Work

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54. Which of the following have same number of lone pairs and bond pairs respectively?

(1) $NH_2^{\ominus}$, SO_2 (2) SO_3^{2-}, $ClO_4^{\ominus}$

(3) CO_3^{2-}, $I_3^{\ominus}$ (4) $I_3^{\ominus}$, XeF_2

55. Isosteric pairs among the following is/are

(1) N_2, CO and CN^-

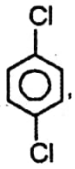
(2) $NO_2^{\ominus}$ and O_3

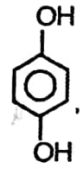
(3) NO_3^- and CO_3^{2-}

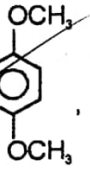
(4) All of these

56. Pair of molecule having non-zero dipole moment is

(1) H_2O_2, 

(2) , ClF_3

(3) , PCl_3F_2

(4) , PCl_2F_3

57. Which of the following is exception to the Octet rule?

(1) Cl_2O (2) NO_2 (dimer)

(3) $BeCl_2$ (solid) (4) PCl_5 (solid)

58. Incorrect match is

(1) $N > O > F_2$	Second ionisation energy
(2) $C_2H_6 < C_2H_4 < C_2H_2$	Electronegativity of carbon
(3) $Cl_2 > Br_2 > F_2 > I_2$	Bond dissociation energy
(4) $Li^{\oplus}(aq) > Na^{\oplus}(aq)$	Ionic radius

59. If IE and EA of an element are x kJ/mol and y kJ/mol respectively then electronegative of an element in Mulliken scale is

(1) $\frac{IE+EA}{2}$ (2) $\frac{IE+EA}{540}$

(3) $\frac{IE+EA}{5.6}$ (4) $\frac{IE+EA}{2\times 96.48}$

60. Consider the following statements

(a) Repulsion of valence electrons by the electrons in penultimate shell to reduce effective nuclear charge is known as screening effect

(b) IE_1 of Na equals to ΔH_{eg} of $Na^{\oplus}$ ion

(c) Penetration effect order $s > p > d > f$

(d) Second ΔH_{eg} of oxygen is endoergic

Correct statement is/are

(1) a, c (2) c, d

(3) a, b, d (4) All of these

61. Calculate the bond length of (C–X) bond, if C–C bond length is 1.54 Å, X–X bond length is 1.00 Å and electronegativity values of C and X are 2.0 and 3.0 respectively.

(1) 1.18 Å (2) 1.36 Å

(3) 0.80 Å (4) 0.87 Å

62. The decreasing order of second ionisation energy of K, Ca and Ba is

(1) Ba > K > Ca (2) K < Ba < Ca

(3) K > Ca > Ba (4) Ca > Ba > K

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63. Match the following

Column I	Column II
a. Liquid element at 30°C	(i) Ag
b. Element kept in water	(ii) Cs
c. Element having high density	(iii) Phosphorus
d. Highest electrical conductor	(iv) Iridium

(1) a(iv), b(ii), c(iii), d(i)
(2) a(iii), b(i), c(iv), d(ii)
(3) a(ii), b(iii), c(iv), d(i)
(4) a(ii), b(iv), c(i), d(iii)

64. If Aufbau rule is not followed, $^{39}_{19}K$ will be placed in _____ block.
(1) *d* (2) *f*
(3) *s* (4) *p*

65. Correct order of negative electron gain enthalpy is
(1) S > F > Se > O (2) O > F > S > Se
(3) F > S > O > Se (4) F > S > Se > O

66. Consider the following statements
(a) Element having atomic number 70 belongs to group 3
(b) First ionisation energy of Pb is more than Sn
(c) Indium have lowest first ionisation energy in group-13
(d) Be and Mg are alkaline earth metals
Incorrect statement is/are
(1) Only d (2) a, b, d
(3) a, d (4) a, c, d

67. Maximum number of electron in subshell having $n = 3$, $\ell = 2$ is
(1) 6 (2) 10
(3) 2 (4) 3

68. If radius of 3rd orbit of Li^{2+} ion is x, then de-Broglie wavelength of electron in 2nd orbit of $He^{\oplus}$ ion is
(1) $\frac{6\pi x}{5}$ (2) $3\pi x$
(3) $\frac{2\pi x}{3}$ (4) $\frac{2x}{\pi}$

69. Which pair of elements do not have stable configuration?
(1) Eu, Pm (2) Gd, Lu
(3) Pd, Cd (4) Am, Cm

70. Total number of electrons having $(\ell + m) = 0$ for element having 2K, 8L, 13M, 1N configuration are
(1) 12 (2) 13
(3) 7 (4) 9

71. Incorrect statement among the following is/are
(1) Magnetic quantum number determines orientation of orbital
(2) Number of orbital in particular subshell is $(2\ell + 1)$
(3) $3d_{x^2-y^2}$ and $3d_{z^2}$ have same energy in the absence of electric and magnetic field
(4) SF_4 and PCl_5 have identical shape

72. Ratio of wavelength of 1st line of Balmer series to the limiting line of Paschen series in hydrogen atom is
(1) 4 : 5 (2) 2 : 3
(3) 4 : 1 (4) 5 : 4

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73. Pauli's exclusion principle is valid for

(1) Li (2) Be

(3) He (4) All of these

74. Correct for electron present in $3d_{xy}$ orbital is

(1) Orbit angular momentum = $3\hbar$

(2) Electron probability zero along yz and zx plane

(3) Orbital angular momentum is $\sqrt{6}\,\hbar$

(4) All are correct

75. Match the following.

Column I	Column II
a. Number of revolution per second	(i) $-\frac{KZe^2}{r}$
b. Velocity of electron	(ii) $\propto \frac{Z}{n}$
c. Total number of lines when electron de-excited from n^{th} excited state to ground state	(iii) $\propto \frac{Z^2}{n^3}$
d. Potential energy of electron	(iv) $\frac{n(n+1)}{2}$
	(v) $\frac{n(n-1)}{2}$

(1) a(ii), b(i), c(iii), d(v)

(2) a(iii), b(ii), c(v), d(i)

(3) a(i), b(iii), c(iv), d(ii)

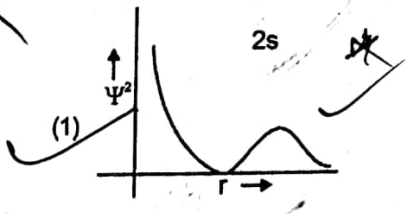
(4) a(iii), b(ii), c(iv), d(i)

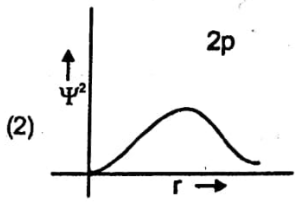
76. If Hund's rule is invalid then magnetic moment of phosphorus will be

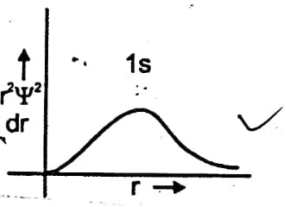
(1) $\sqrt{15}$ BM (2) $\sqrt{35}$ BM

(3) $\sqrt{3}$ BM (4) $\sqrt{8}$ BM

77. Correct graph among the following is/are

(1) 

(2) 

(3) 

(4) All of these

78. Ratio of total energy to the potential energy of electron in the first orbit of H is

(1) –1 (2) $-\frac{1}{2}$

(3) $\frac{1}{2}$ (4) 1

79. Which of the following has negative value of ΔH_{eg}?

(1) O (2) Na

(3) He (4) N

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80. Equivalent weight of carnallite ($KCl.MgCl_2.6H_2O$) having molecular mass (M) is

(1) $\frac{M}{5}$ (2) $\frac{M}{6}$

(3) $\frac{M}{3}$ (4) $\frac{M}{4}$

81. In the following reaction

$A_2(g) + 2B_4(g) \longrightarrow 2AB_4(g)$

2 g-atom of B reacts with 4 g-molecule of A_2. Volume of AB_4 (g) formed at STP is

(1) 22.4 L (2) 11.2 L

(3) 44.8 L (4) 33.6 L

82. Mole fraction of I_2 in C_6H_6 is 0.2. Molality of I_2 in C_6H_6 is

(1) 3.2 m (2) 6.4 m

(3) 2.3 m (4) 4.5 m

83. In which of the following case velocity of electron equal to 2nd Bohr orbit of He^+ ion?

(1) n = 1 of H-atom (2) n = 4 of Be^{3+}

(3) n = 3 of Li^{2+} (4) All of these

84. Which of the following contain maximum number of electrons?

(1) 10 g SO_4^{2-} ion (2) 3 g molecule of CO

(3) 3 g-atom of oxygen (4) 1 g-ion of $NO_3^{\ominus}$

85. The number of oxygen atoms required to combine with 7.0 g of N_2 to form N_2O_3 if 80% of N_2 is converted into products

(1) 18×10^{23} (2) 6.02×10^{23}

(3) 3.24×10^{23} (4) 3.6×10^{23}

86. Ratio of volume of 1 equivalent of O_2 and H_2 at STP is

(1) 1 : 4 (2) 2 : 1

(3) 1 : 1 (4) 1 : 2

87. Equivalent weight of N_2O (molecular mass M) in the following reaction is

$2NH_2OH + 4Fe^{3+} \longrightarrow N_2O + H_2O + 4Fe^{2+} + 4H^{\oplus}$

(1) $\frac{M}{3}$ (2) $\frac{M}{8}$

(3) $\frac{M}{4}$ (4) $\frac{M}{5}$

88. 20 mL of x M HCl neutralises completely the mixture of 10 mL 0.1 M $NaHCO_3$ and 5 mL of 0.2 M Na_2CO_3 solution using methyl orange indicator. The value of x is

(1) 0.15 M (2) 0.2 M

(3) 0.167 M (4) 0.133 M

89. 1.2 g of Mg is burnt in a closed vessel which contains 0.5 g of O_2. Millilitres of 0.25 M H_2SO_4 required to dissolve the residue in the vessel is

(1) 200 mL (2) 250 mL

(3) 12.5 mL (4) 175 mL

90. The mass of carbon present in 0.1 mol of sodium ferricyanide $Na_3[Fe(CN)_6]$ is equal to

(1) Mass of carbon in 0.6 g-molecule of CO_2(g)

(2) Mass of magnesium in 0.3 mol of $MgSO_4$

(3) Mass of carbon in 0.05 mol of sucrose

(4) All of these

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[BIOLOGY]

91. Classical taxonomy includes
(1) Ontogeny
(2) Phylogeny
(3) Morphological features
(4) Internal study

92. The most accepted definition of a biological species was given by
(1) Ernst Mayr (2) Darwin
(3) Linnaeus (4) Carl Woese

93. All plants, animals, fungi and microbes exhibit/show
(a) Metabolism (b) Reproduction
(c) Consciousness (d) Growth
(e) Response
Choose correct option.
(1) (a), (b) & (e) (2) (a), (c), (d) & (e)
(3) (a), (b), (c) & (d) (4) (b), (c) & (d)

94. Choose correct option :
(a) Domain is a category higher than kingdom
(b) Properties of cell organelles are present in their molecular constituents
(c) Isolated metabolic reactions *in vitro* are living reactions
(d) Growth is a defining property of living organisms
(1) (c) & (d) (2) (a) & (d)
(3) (a) & (c) (4) (a) & (b)

95. Growth and reproduction are synonymous for
(1) *Chara* (2) Mosses
(3) *Hydra* (4) *Clostridium*

96. Systematics deals with
(1) Different kinds of organisms
(2) Evolutionary relationships
(3) Diversity of organisms
(4) More than one option is correct

97. Choose correct scientific name of mango.
(1) *Mangifera Indica* Linn.
(2) *Mangifera Indica* L.
(3) Mangifera *indica* L.
(4) *Mangifera indica* Linn.

98. Scientific name of "Brinjal" is standarised through rules given is
(1) ICBN (2) ICNCP
(3) ICZN (4) ICNB

99. *Mangifera*, *Solanum* and *Panthera* represent/belong to
(a) Different taxa (b) Same level
(c) Different class (d) Same order
Choose correct option.
(1) (a), (b) & (c) (2) (b), (c) & (d)
(3) (a) & (b) (4) (b) & (c)

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100. *Felis* + *Panthera* → A

Solanaceae + Convolvulaceae → B

Identify A and B and choose the correct option.

(1) A - Felidae, B - Sapindales

(2) A - Canidae, B - Polymoniales

(3) A - Canidae, B - Poales

(4) A - Felidae, B - Polymoniales

101. Classes comprising animals like fishes, amphibians, reptiles, birds and mammals constitute the next higher category called

(1) Order

(2) Kingdom

(3) Division

(4) Phylum

102. Two plants showing morphological similarities were cross-pollinated. But after the mating progeny formation was absent. So the two plants must be considered as

(1) Different biological species

(2) Same taxonomic species

(3) Same biological species

(4) Allopatric species

103. Collection of living plants for reference is present in

(1) Herbarium

(2) Botanical garden

(3) Museum

(4) More than one option is correct

104. How many of the given features are associated with keys?

Couplet, Quick referral system, *Ex-situ* Conservation, Analytical, Preservation of specimen, Lead

(1) Five

(2) Six

(3) Four

(4) Three

105. The actual account of habitat and distribution of plants of a given area is provided by

(1) Journal

(2) Catalogue

(3) Flora

(4) Manual

106. Members of mollicute like organisms

(1) Are pleiomorphic, non-motile

(2) Cannot synthesise peptidoglycan

(3) Are facultative anaerobes

(4) More than one option is correct

107. Structural and functional feature of fungi in endomycorrhiza is

(1) Extracellular sheath

(2) Arbuscule

(3) Hartig net

(4) Mantle

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108. Choose incorrect option w.r.t. lichen.

	Phycobiont	Mycobiont
(1)	Carbon dioxide fixer	Nitrogen fixer
(2)	Green alga	Higher fungi
(3)	Photoautotrophs	Chemoorganotrophs
(4)	Cyanobacteria	Ascomycetes

109. How many of the given below features are associated with sub-viral agents?

(a) Prions - Neurodegenerative diseases

(b) Virusoids - Need a helper virus

(c) Viroid - Cause disease in plants

(d) Satellite virus - Satellite tobacco necrosis virus

(1) Three (2) Four

(3) Two (4) One

110. Most common type of genetic material present in bacteriophages is

(1) ds DNA (2) ss DNA

(3) ds RNA (4) ss RNA

111. Which of the given below features are associated with phage life cycle that culminates with the host cell bursting and releasing virions?

(a) Lysogen formation (b) Virulent viruses

(c) Lytic cycle (d) Prophage formation

Choose correct option :

(1) (c) & (d) (2) (b) & (d)

(3) (a) & (d) (4) (b) & (c)

112. Choose incorrect match.

(1) Viroid – Capsomere

(2) T_2 – Naked

(3) HIV – Envelope

(4) TMV – Helical symmetry

113. Haeckel's protista include

(1) Unicellular eukaryotes

(2) Unicellular prokaryotes

(3) Microscopic organisms

(4) More than one option is correct

114. Carl Woese used rRNA gene sequence as a molecular marker and distinguished _____ eukaryotic domains.

(1) Two (2) One

(3) Six (4) Three

115. A unicellular eukaryotic Wall-less microbe was collected by a student from rain water. His teacher grouped the organism in _____ kingdom according to Linnaeus system and _____ kingdom according to Whittaker's system.

(1) Plants, Protista (2) Animalia, Protista

(3) Animalia, Monera (4) Monera, Plantae

116. How many kingdom's in Whittaker's classification system includes organisms with only cellulosic cell wall?

(1) Three (2) Five

(3) Four (4) Two

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117. Choose odd one out w.r.t. features of protists.

(1) Cell structure is eukaryotic

(2) Largely terrestrial habitat

(3) Show locomotion by flagella or cilia

(4) Sexual reproduction involves meiosis and fertilization

118. Nuclear dimorphism is shown by

(1) *Plasmodium* (2) *Trypanosoma*

(3) *Paramecium* (4) *Amoeba*

119. Choose the correct match.

(1) Desmids – Chrysophytes

(2) *Gymnodinium* – Hemicellulosic plates in wall

(3) *Gonyaulax* – Red sea

(4) *Euglena* – Chlorophyll a & c

120. A proteinaceous covering which is elastic enough to enable turning and flexing of the cell, yet rigid enough to prevent excessive alternation in shape is

(1) Pellicle in *Amoeba*

(2) Plasma membrane in *Gonyaulax*

(3) Pellicle in *Euglena*

(4) Plasmalemma in *Paranema*

121. Diatomaceous earth is

(1) Indestructible frustule

(2) Fucoxanthin which gives golden colour

(3) Gritty and inert in nature

(4) More than one option is correct

122. What may be a 'photosynthetic protistian' to one biologist may be 'a plant' to another? Which of the given below features of slime moulds shows linkage with plant?

(1) Slime moulds have cellulosic spore wall

(2) Formation of fruiting bodies

(3) Presence of holozoic nutrition

(4) Presence of diverse sexual reproduction

123. The mode of nutrition present in *Euglena* is referred to as

(1) Phototrophy (2) Chemotrophy

(3) Osmotrophy (4) Mixotrophy

124. Site of karyogamy and meiosis in *Rhizopus* is

(1) Zygospore (2) Basidiospore

(3) Oospore (4) Ascospore

125. Once the perfect stages of members of deuteromycetes were discovered they were often moved to

(1) Zygomycetes and Ascomycetes

(2) Basidiomycetes and Oomycetes

(3) Oomycetes and Zygomycetes

(4) Ascomycetes and Basidiomycetes

126. An extremely important research tool in genetics and biochemistry is

(1) Pink mould (2) Blue green mould

(3) Pin mould (4) Black mould

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127. Choose the best option w.r.t. Fungi.

	Nutrition	Respiration	Reserve food	Habitat
(1)	Chemoheterotrophs	Aerobic	Glycogen	Warm
(2)	Decomposers	Anaerobic	Starch	Terrestrial
(3)	Saprotrophs	Aerobic	Starch	Moist
(4)	Osmotroph	Anaerobic	Glycogen	Aquatic

128. Choose the incorrect match.

(1) Ascomycetes – Coprophilous

(2) Basidiomycetes – Puff balls

(3) Oomycetes – Chitinous cell wall

(4) Zygomycetes – Saprophytes

129. How many of the given below features are common for sac and club fungi?

Dikaryotic stage, Meiospores, Thick walled zygote, Planospores, Fruiting bodies, Conidia

(1) Four (2) Five

(3) Two (4) Three

130. Which of the following bacteria are able to manufacture their food from inorganic raw material with the help of energy derived from exergonic chemical reactions involving oxidation of an inorganic substance?

(1) *Pseudomonas, Clostridium*

(2) *Nostoc, Anabaena*

(3) *Nitrosomonas, Nitrobacter*

(4) *Chlorobium, Chromatium*

131. Bacteria is a group of prokaryotic organisms which is characterized by

(1) 70 S ribosomes,

(2) Peptidoglycan cell wall

(3) Simple structure and complex behaviour

(4) More than one option is correct

132. How many of the given below features are associated with the parasexual reproduction in the bacteria?

(a) Gametogenesis

(b) Sex pili

(c) Recombination

(d) Meiosis

(e) Syngamy

(1) Two (2) Six

(3) Three (4) Four

133. Mycelial bacteria

(1) Are CO_2 fixers

(2) Show symbiotic association with legumes

(3) Is exemplified by *Frankia* and *Rhizobium*

(4) May enhance the soil nitrogen content

134. Which of the following bacteria carry out oxygenic photosynthesis by means of a photosynthetic apparatus similar to the eukaryotes?

(1) Purple sulphur bacteria

(2) Green sulphur bacteria

(3) Cyanobacteria

(4) More than one option is correct

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135. Many *Archaea* have special structural, chemical and metabolic adaptations that enable them to grow in extreme habitats. Choose the correct option w.r.t. these adaptations.

(a) Monolayer cell membrane

(b) Pseudomurein cell wall

(c) Branched chain lipids

(d) Primitive nucleus

(1) (b), (c) & (d)

(2) (a), (b) & (c)

(3) (a), (b) & (d)

(4) (a), (c) & (d)

136. What is **not** true about *Locusta*?

(1) Cleavage is spiral and determinate

(2) Excretory organs are malpighian tubules. Remove the nitrogenous waste in the form of urea

(3) Forewings called as elytra/tegmina do not help in flying

(4) Mouth develops from embryonic blastopore

137. Hemichordates differ from chordates, in that hemichordates

(1) Do not possess notochord

(2) Are bilaterally symmetrical, triploblastic and coelomate animals

(3) Are gill breathers

(4) Fertilisation is external and development is indirect

138. A newspaper article reports that some carp in a local pond are approximately 50 years old. How can this claim be verified?

(1) By comparing the colour of the fish with younger fish from the same pond

(2) By counting dark and light layers in a cross section of one fish

(3) By counting the number of growth rings on a scale from one of the fish

(4) By comparing the size of the fish with younger fish from the same pond

139. Which of the following is not a key characteristic of fishes?

(1) Single loop circulation

(2) Tympanic membrane

(3) Vertebral column

(4) Gills

140. True statement is

(1) The best characteristic for identifying a bird is the presence of wings

(2) Endothermy allows many animals to live in cold climates

(3) All reptiles have 3-chambered heart

(4) In *Exocoetus* pelvic fins become large by which it can glide into air

141. Which of the following character is present in *Chameleon* but not in *Calotes*?

(1) Prehensile tail

(2) Jacobson's organ is the roof of the mouth

(3) Camouflaging

(4) Ability to detach their tail, that is autotomy

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142. *Ornithorhynchus* differs from *Macropus* in that, *Ornithrhynchus*

(1) Has milk producing mammary glands by which the young ones are nourished

(2) Is oviparous

(3) Has external ears or pinnae and nourishes the unborn via placenta

(4) Is viviparous

143. Which one of the following group of animals is not correctly matched with its one/two characteristics and taxon?

	Animals	Characteristics	Taxon
(1)	*Salamandra*, *Rana*, *Bufo*	(i) Fertilisation is external (ii) Oviparous and development is indirect	Amphibia
(2)	*Hemidactylus*, *Calotes*, *Naja*	(i) All are poisonous and shed their scales as skin cast (ii) Fertilisation is internal	Reptilia
(3)	*Scoliodon*, *Pristis*, *Carcharodon*	(i) Notochord is persistent throughout the life (ii) Fertilisation is internal, viviparous	Chondrichthyes
(4)	*Exocoetus*, *Mackerel*, *Hilsa*	(i) Marine water edible fishes (ii) Skin is covered with cycloid/ ctenoid scales	Osteichthyes

144. False statement is

(1) Amphibians do not breathe the same way as other terrestrial vertebrates do. They have positive pressure breathing

(2) Tracheae are insects with highly vascular capillary system comprise an extensive network of air filled tubular passages connecting the surface of an insect to all portions of its body

(3) Counter-current exchange of gases makes the fish gills the most efficient of all respiratory organs

(4) Puffer fish is the second most poisonous fish

145. The diagram below illustrates a medusa. Study the diagram to answer the question that follows.



In which group and its examples this body form is dominant?

(1) Scyphozoa : *Aurelia*, Jellyfishes

(2) Cnidaria : *Aurelia*, *Obelia*, *Physalia*

(3) Hydrozoa : *Obelia*, *Physalia*, *Hydra*

(4) Anthozoa : *Meandrina*, *Pennatula*, *Adamsia*

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146. Which of the following is **not** correct matching of phylum and its three examples?

(1) Aschelminthes : *Ancylostoma*, *Enteroblus*, *Tubifex*

(2) Arthropoda : *Buthus*, *Lepisma*, *Leptocorisa*

(3) Annelida : *Aphrodite*, *Chaetopterus*, *Bonnelia*

(4) Mollusca : *Teredo*, *Aplysia*, *Chaetopleura*

147. Which of the following is **incorrect** of excretory and respiratory structures of animals mentioned?

Animals	Excretory Structure	Respiratory Structures
(1) Prawn	Green glands	Book gills
(2) Earthworms	Micronephridia	Skin
(3) *Locusta*	Malpighian tubules	Tracheae
(4) Scorpion	Coxal glands	Book lungs

148. Coelom of animals commonly called schizocoelom as in earthworms, originates by/from

(1) Splitting up of embryonic mesoderm and is filled with coelomic fluid

(2) Process of coelom formation called as schizocoely and is filled with blood

(3) Process of coelom formation called as enterocoely

(4) Blastocoel

149. Which of the following is common feature of *Torpedo* and *Trygon*?

(1) They have placoid scales and belong to class chondrichthyes

(2) They possess a poison sting on the tail. The poison so released is strong enough to stun an animal

(3) They live in fresh water

(4) They possess electric organs as modified musculature between eyes and nostrils

150. Complete the following analogy : Pigeon's milk : Crop : : Song :

(1) Proventriculus

(2) Anterior air sacs

(3) Syrinx

(4) Trachea

151. What do all arthropods have in common?

(1) A cephalothorax

(2) Jointed appendages

(3) Spiracles

(4) Antennae

152. What are the respiratory organs and excretory organs of crayfish, respectively?

(1) Tracheae, Malpighian tubules

(2) Book lungs, Coxal glands

(3) Gills, Green glands

(4) Lungs, Kidneys

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153. Complete the following analogy :

Fluke : Schistosomiasis : : Filaria worm :

(1) Encysted meat (2) Swimmer's itch

(3) Trichinosis (4) Elephantiasis

154. Where do blood Flukes of the genus *Schistosoma/ Bilharzia* reproduce sexually and asexually respectively?

(1) Inside a cow intestine and snail

(2) Inside human blood vessels and snail

(3) In water and man

(4) Inside the snail and human blood vessels

155. Which of the following animal is correctly matched with its one/two characteristics and taxon?

	Animal	Characteristics	Taxon
(1)	Sea anemone	(i) Biradial symmetry	Cnidaria
		(ii) Exists in polyp form only	
(2)	Prawn	(i) Gills	Arachnid
		(ii) Two pairs of antennae	
(3)	*Sycon*	(i) Choanocytes for generating water current	Porifera
		(ii) Both intracellular and extra-cellular digestion	
(4)	Silverfish	(i) Ventral nerve cord (ii) Metameric segmentation	Chordate

156. False statement about echinoderms is

(1) Cleavage is indeterminate and radial

(2) Endodermal skeleton made up of calcareous ossicles

(3) All are marine. Adult echinoderms are radially symmetrical but their larvae are bilaterally symmetrical

(4) An excretory system is absent

157. Which of the following is not true about *Octopus* illustrated in the diagram?



(1) Open circulatory system

(2) Jet propulsion for locomotion

(3) Dioecious and direct development

(4) A true coelom, that is schizocoelom

158. Which of the following group of animal have a partially open, fluid filled body cavity which develops from the first formed embryonic cavity blastocoel?

(1) Roundworms

(2) Shipworms

(3) Flatworms

(4) Earthworms

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159. Which one of the following sets of items in the options (1) to (4) are not correctly categorised with one exception in it?

	Items	Category	Exception
(1)	*Nereis* *Pheretima* *Hirudinaria*	Monoecious	*Nereis*
(2)	*Ascaris* *Ancylostoma* *Trichinella*	Oviparous	*Ancylostoma*
(3)	*Locusta* Butterfly *Lepisma*	Presence of wings	*Lepisma*
(4)	*Pila* *Pinctada* *Octopus*	Radula	*Pinctada*

160. Which of the following is **incorrect** match of animal group/life style/structure/function?

	Animal group	Lifestyle	Structure/functions
(1)	Flatworms	Free living or parasite	Flame cells/ excretion Tegument/protection
(2)	Molluscs	Terrestrial, marine, fresh water inhabitants	Radula/feeding mantle/motility
(3)	Sponges	Sessile filter feeders	Amoebocytes/carry food and wastes Spicules/support and protection spongin/ support
(4)	Cnidarians	Free floating or attached	Gastrovascular cavity/digestion Cnidocytes/ protection and food getting

161. Which of the following is/are correct with identification of sex of the animals?

A. In male *Scoliodon* pelvic fins bear claspers

B. Male frogs can be distinguished by the presence of sound producing vocal sacs and also a copulatory pad on the first digit of the hind limbs which are absent in female frogs

C. In *Ascaris*, females are longer than the males and their post anal tail is straight

D. In male cockroach, anal styles are present arising from ninth sternum

Choose the correct option.

(1) A, C & D (2) A, B, C & D

(3) A & B (4) A, B & C

162. Ctenophores are

(1) Hermaphrodites and show only sexual reproduction

(2) Triploblastic, acoelomate with biradial symmetry

(3) Both in fresh and marine water

(4) Asexual creatures and hermaphrodites

163. Which of the following is true about lizards and *Salamandra*?

(1) They are amniotes

(2) They have metamerically segmented post-anal tail and three-chambered heart

(3) Body is covered by dry and cornified skin that contains epidermal scales, which are shed as skin cast

(4) They have internal fertilisation

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164. False statement about rotifers is

(1) Cilia surrounding the anterior end forms corona, and sweeps the food into the digestive tract

(2) They do not show parthenogenesis

(3) They are pseudocoelomates

(4) Commonly called as wheel worms

165. A Portuguese man of war and a hydra are similar in that, both :

(1) Produce planulae

(2) Have stinging cells present in the ectoderm of tentacles and are carnivorous animals

(3) Are colonial

(4) Contain medusas and polyps, and exhibit metagenesis

166. What is the correct mechanism of discharge of cnidocyte, illustrated in the diagram below?



(1) Using a spring like apparatus

(2) Muscle contraction that 'throw' the nematocyst

(3) Building up a high internal osmotic pressure

(4) Ejecting it with a jet of water

167. Which of the following is not present in *Nereis*?

(1) Trochophore larva

(2) Open circulatory system

(3) A coelom

(4) Parapodia and setae

168. Rays and skates differ from sharks in

(1) Pectoral fins are not sharply demarcated from the body

(2) In males the pelvic fins bear claspers

(3) Gill slits are on the lateral sides of the head and they are fast swimming predators

(4) Their skin is covered with placoid scales

169. Which of the following characters does not describe lancelets?

(1) They are the only chordates with flame cells as excretory structures

(2) They have a single ventral nerve cord with nerves attached to it that travel to different parts of the body

(3) They belong to sub-phylum cephalochordata and are acraniates, exclusively in marine waters

(4) Notochord extends from head to tail region and is persistent throughout their life

170. Which of the following do adult chordates and adult echinoderms have in common?

(1) Endoskeleton, mesodermal in origin and are deuterostomic

(2) Kidneys for excretion

(3) A non-segmented body

(4) Bilateral symmetry

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171. Key evolutionary advances of the flatworms are bilateral symmetry and
(1) Internal organs
(2) Intracellular digestion
(3) A one-way digestive tract
(4) A body cavity

172. Which of the following is not an amphibian adaptation for life on land?
(1) Watertight skin with an exoskeleton of epidermal scales
(2) More efficient heart with incomplete double circulation
(3) Most of them have two pairs of limbs
(4) Lungs

173. What evidence convinced scientists that *Archaeopteryx* should be classified as a bird rather than a small dinosaur?
(1) Hard shelled eggs and tail with free tail vertebrae
(2) Fused collar bone
(3) Teeth
(4) Hollow bones

174. Which of the following describes reptiles but not birds?
(1) The hind limbs generally have scales
(2) They have watertight eggs and are amniotes
(3) They are ectotherms
(4) The digestive tract has additional chambers in the form of crop and gizzard

175. Animals like bats have/are
(1) Endothermic
(2) Efficient respiration. Non-vascular air sacs are connected to lungs to supplement respiration
(3) Hollow skeleton
(4) Feathers which are modified reptilian scales

176. Read the statement A and the reason R and then choose the correct answer.

Statement A : *Petromyzon* is included under the division Agnatha and it is not a true fish.

Reason R : It is a jawless vertebrate and its body is devoid of scales and paired fins.

(1) The statement is false but the reason is an accepted fact
(2) Both statement and reason are true and the reason explains the statement
(3) Statement and reason are true in themselves but the reason does not explain the statement
(4) The statement is true but the reason is false

177. The evolution of an internal body cavity/coelom offered an advantage in animal body design in all areas, **except**
(1) Circulation
(2) Greater freedom of movement
(3) Evolution of efficient organ systems
(4) Provides space within which the gonads can expand and large number of gametes stored

178. What is true about deuterostomes, example frog?
A. Anus develops from blastopore
B. Cleavage is determinate
C. The process of coelom formation is called as enterocoely
D. Have 'split body cavity', mesoderm splits to form the coelom
(1) A and C
(2) A and D
(3) A, C and D
(4) A, B and D

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179. A key evolutionary development seen for the first time in the sponges is

(1) Internal organs and a body cavity

(2) Multicellularity

(3) Tissues

(4) Germ layers

180. The segments of earthworms are

(1) Present in mesoderm but not in the ectoderm

(2) Repetitive, with serial repetition of at least some organs

(3) Apparent in the embryo but not in the adult

(4) Specialised for different functions and are present in endoderm only

❑ ❑ ❑

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